





July 1974



**U.S. DEPARTMENT OF COMMERCE**  
**National Bureau of Standards**  
Boulder, Colorado 80302

TO: Cryogenics Division Mailing List

SUBJECT: Announcement of Publications, Supplement No. 3

Gentlemen:

Attached is Supplement Number Three to our new list of Cryogenics Division publications. That new list was published as NBS TN-639 and is available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402 (Order by No. C13.46:639 - 75¢).

There are a number of papers in this supplement which are of wide interest and give some idea as to the current direction of the Division's research effort. You will note a number of papers on methane and its properties which are related to our efforts in LNG technology. In particular, I would like to draw your attention to R-825 which the American Gas Association is hoping to have adopted as an industry-wide standard. PP-LN4 also offers this same document as a candidate for an International Standard.

In case any of you are unaware or have forgotten, the Cryogenic Data Center publishes three serial publications in the field of cryogenics. Subscriptions to these publications may be ordered from National Technical Information Service, Springfield, Virginia 22151, at the yearly prices indicated:

Current Awareness Service

(published weekly - contains a subject index in each issue)

North America	\$20
Elsewhere	\$25

Superconducting Devices and Materials

(published quarterly - includes subject and author index as well as a summary of important papers in each issue)

Everywhere	\$20
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Liquefied Natural Gas

(published quarterly - includes subject and author index in each issue)

Everywhere	\$20
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Sincerely,

A handwritten signature in dark ink, appearing to read "Neil A. Oliën", is written over the typed name.

NEIL A. OLIEN

Acting Chief, Cryogenic Data Center  
Cryogenics Division  
Institute for Basic Standards

Attachment

NATIONAL BUREAU OF STANDARDS  
INSTITUTE FOR BASIC STANDARDS  
CRYOGENICS DIVISION  
BOULDER, COLORADO 80302

List of Publications, Supplement No. 3  
January to July 1974

NOTICE: Copies of these publications may be obtained as indicated by the superscript at the end of each item. The superscripts refer to availability and are listed on page 3.

- R-794 SUPERCONDUCTING LEVITATION OF HIGH SPEED VEHICLES, by V. D. Arp, A. F. Clark and T. M. Flynn. Transp. Eng. J. Vol 99, No. TE4, 873-85 (Nov 1973). (No charge for single copy)<sup>6</sup>
- R-795 MEASUREMENTS OF LIQUEFIED NATURAL GAS IN COMMERCE, by D. B. Mann, D. E. Diller, N. A. Olien and M. J. Hiza. American Gas Association Operating Section Proceedings - 1973, D-206-D-214. American Gas Association, Inc., Arlington, Va. (1973). (No charge for single copy)<sup>6</sup>
- R-796 THERMODYNAMIC AND TRANSPORT PROPERTIES OF CRYOGENIC PROPELLANTS AND RELATED FLUIDS, by V. J. Johnson. Cryogenics and Gases. Testing Methods and Standards Development. American Society for Testing and Materials, Philadelphia, Pa., Publication No. STP 537, 64-78 (1973). (No charge for single copy)<sup>6</sup>
- R-797 THE THERMODYNAMIC PROPERTIES OF COMPRESSED GASEOUS AND LIQUID FLUORINE, by R. Prydz and G. C. Straty. Nat. Bur. Stand. (U.S.), Tech. Note No. 392-Revised, 197 pages (Sep 1973). (C13.46:392/2(Rev) - \$2.20)<sup>3</sup>
- R-798 THERMOPHYSICAL PROPERTIES OF NITROGEN FROM THE FUSION LINE TO 3500 R (1944 K) FOR PRESSURES TO 150,000 PSIA ( $10342 \times 10^6$  N/m<sup>2</sup>), by R. T. Jacobsen, R. B. Stewart, R. D. McCarty and H. J. M. Hanley. Nat. Bur. Stand. (U.S.), Tech. Note No. 648, 162 pages (Dec 1973). (C13.46:648 - \$1.25)<sup>3</sup>
- R-799 SUPERCRITICAL HELIUM HEAT TRANSFER, by P. J. Giarratano. Applications of Cryogenic Technology, Vol 5 (Proc. of the CRYO-72 Conf., Chicago, Ill., Oct 3-5, 1972), Chap. 4, 52-89. Scholium International, Inc., Whitestone, N. Y. (1973). (No charge for single copy)<sup>6</sup>
- R-800 DIELECTRIC CONSTANT AND POLARIZABILITY OF SATURATED AND COMPRESSED FLUID METHANE, by G. C. Straty and R. D. Goodwin. Cryogenics Vol 13, No. 12, 712-5 (Dec 1973). (No charge for single copy)<sup>6</sup>
- R-801 ELECTRICAL RESISTIVITY OF ELECTROLYTIC IRON, SRM 797, AND AUSTENITIC STAINLESS STEEL, SRM 798, FROM 5 to 280 K, by J. G. Hust. Nat. Bur. Stand. (U.S.), Spec. Publ. No. 260-47, 20 pages (Feb 1974). (C13.10:260-47 - 55¢)<sup>3</sup>
- R-802 USING THE SEMICONDUCTOR JUNCTION IN QUANTUM INTERFERENCE DEVICES, by M. B. Simmonds. J. Appl. Phys. Vol 45, No. 1, 366-8 (Jan 1974). (No charge for single copy)<sup>6</sup>
- R-803 RELATIONSHIP BETWEEN SINGLE-CRYSTAL AND POLYCRYSTAL ELASTIC CONSTANTS, by H. M. Ledbetter and E. R. Naimon. J. Appl. Phys. Vol 45, No. 1, 66-9 (Jan 1974). (No charge for single copy)<sup>6</sup>
- R-804 ELASTIC CONSTANTS OF THE PEROVSKITE RbMnF<sub>3</sub> USING A BORN MODEL, by E. R. Naimon. Phys. Rev. B Vol 9, No. 2, 737-40 (Jan 1974). (No charge for single copy)<sup>6</sup>
- R-805 THE VISCOSITY AND THERMAL CONDUCTIVITY COEFFICIENTS OF DILUTE ARGON, KRYPTON, AND XENON, by H. J. M. Hanley. J. Phys. Chem. Ref. Data Vol 2, No. 3, 619-42 (1973). (American Chemical Society, Washington, D. C. - \$3.50)<sup>4</sup>
- R-806 AN EVALUATION OF SELECTED ANGULAR MOMENTUM, VORTEX SHEDDING AND ORIFICE CRYOGENIC FLOWMETERS, by J. A. Brennan, R. W. Stokes, C. H. Kneebone and D. B. Mann. Nat. Bur. Stand. (U.S.), Tech. Note No. 650, 69 pages (Mar 1974). (C13.46:650 - 65¢)<sup>3</sup>

- R-807 PROGRAMS ON LARGE SCALE APPLICATIONS OF SUPERCONDUCTIVITY IN THE UNITED STATES, by R. L. Powell, F. R. Fickett and B. W. Birmingham. Superconducting Machines and Devices - Large Systems Applications (Proc. NATO Advanced Study Institute, Entreves, Italy, Sep 5-14, 1973), S. Foner and B. B. Schwartz, Editors, 651-75. Plenum Publishing Corp., New York (1974). (No charge for single copy)<sup>6</sup>
- R-808 ANALYSIS OF THERMAL DIFFUSIVITY EVALUATION UNDER TRANSIENT CONDITIONS FOR POWDER INSULATIONS, by B. L. Knight, K. D. Timmerhaus and R. H. Kropschot. Paper C-2 in Advances in Cryogenic Engineering Vol 18, 112-7. Plenum Press, New York (1973). (No charge for single copy)<sup>6</sup>
- R-809 THE CLAUSIUS-MOSSOTTI FUNCTIONS (MOLAR POLARIZABILITIES) OF PURE COMPRESSED GASEOUS AND LIQUID METHANE, ETHANE, PROPANE, BUTANES, AND NITROGEN, by D. E. Diller. *Cryogenics* Vol 14, No. 4, 215-6 (Apr 1974). (No charge for single copy)<sup>6</sup>
- R-810 FRACTURE TOUGHNESS TESTS OF A RIGID POLYURETHANE FOAM, by C. W. Fowlkes. *Int. J. Fracture* Vol 10, No. 1, 99-108 (Mar 1974). (No charge for single copy)<sup>6</sup>
- R-811 LNG MEASUREMENT PROJECTS AT NBS (SUMMARY), by J. A. Brennan. International School of Hydrocarbon Measurement, Proc. 49th (Norman, Okla., Apr 16-18, 1974) 464-5 (1974). (No charge for single copy)<sup>6</sup>
- R-812 VISCOSITY OF SATURATED LIQUID METHANE, by W. M. Haynes. *Physica* Vol 70, No. 2, 410-2 (Dec 1973). (No charge for single copy)<sup>6</sup>
- R-813 FIELD-USABLE SHARPLESS WAFERS FOR JOSEPHSON EFFECT DEVICES AT MILLIMETER WAVES, by F. Edrich, J. D. Cupp and D. G. McDonald. *Rev. Phys. Appl.* Vol 9, No. 1, 195-7 (Jan 1974). (No charge for single copy)<sup>6</sup>
- R-814 JOSEPHSON JUNCTIONS AT 45 TIMES THE ENERGY-GAP FREQUENCY, by D. G. McDonald, F. R. Petersen, J. D. Cupp, B. L. Danielson and E. G. Johnson. *Appl. Phys. Lett.* Vol 24, No. 7, 335-7 (Apr 1974). (No charge for single copy)<sup>6</sup>
- R-815 ELASTIC PROPERTIES OF METALS AND ALLOYS, I. IRON, NICKEL, AND IRON-NICKEL ALLOYS, by H. M. Ledbetter and R. P. Reed. *J. Phys. Chem. Ref. Data* Vol 2, No. 3, 531-618 (Jul-Sep 1973). (American Chemical Society, Washington, D. C. - \$5.50)<sup>4</sup>
- R-816 ASRDI OXYGEN TECHNOLOGY SURVEY - VOLUME V: DENSITY AND LIQUID LEVEL MEASUREMENT INSTRUMENTATION FOR THE CRYOGENIC FLUIDS OXYGEN, HYDROGEN, AND NITROGEN, by H. M. Roder. NASA Spec. Publ. No. 3083, 72 pages (1974). (NASA SP-3083 - \$3.75)<sup>7</sup>
- R-817 A REVIEW OF THE COMPATIBILITY OF STRUCTURAL MATERIALS WITH OXYGEN, by A. F. Clark and J. G. Hust. *AIAA J.* Vol 12, No. 4, 441-54 (Apr 1974). (No charge for single copy)<sup>6</sup>
- R-818 OXYGEN ANNEALING OF COPPER: A REVIEW, by F. R. Fickett. *Mater. Sci. Eng.* Vol 14, No. 3, 199-210 (Jun 1974). (No charge for single copy)<sup>6</sup>
- R-819 ELASTIC PROPERTIES OF TWO TITANIUM ALLOYS AT LOW TEMPERATURES, by E. R. Naimon, W. F. Weston and H. M. Ledbetter. *Cryogenics* Vol 14, No. 5, 246-9 (May 1974). (No charge for single copy)<sup>6</sup>
- R-820 A MODIFIED BENEDICT-WEBB-RUBIN EQUATION OF STATE FOR METHANE USING RECENT EXPERIMENTAL DATA, by R. D. McCarty. *Cryogenics* Vol 14, No. 5, 276-80 (May 1974). (No charge for single copy)<sup>6</sup>
- R-821 THERMOCOUPLE REFERENCE TABLES BASED ON THE IPTS-68, by R. L. Powell, W. J. Hall, C. H. Hyink, Jr., L. L. Sparks, G. W. Burns, M. G. Scroger and H. H. Plumb. *Nat. Bur. Stand. (U.S.)*, Monogr. No. 125, 410 pages (Mar 1974). (C13.44:125 - \$4.55)<sup>3</sup>
- R-822 CRYOGENIC REFRIGERATORS - AN UPDATED SURVEY, by T. R. Strobridge. *Nat. Bur. Stand. (U.S.)*, Tech. Note No. 655, 12 pages (Jun 1974). (C13.46:655 - 30¢)<sup>3</sup>
- R-823 ASRDI OXYGEN TECHNOLOGY SURVEY - VOLUME IV: LOW TEMPERATURE MEASUREMENT, by L. L. Sparks. NASA Spec. Publ. No. NASA SP-3073, 155 pages (1974). (NASA SP-3073 - \$5.00)<sup>7</sup>

- R-824 VELOCITY OF SOUND IN DENSE FLUID METHANE, by G. C. Straty. Cryogenics Vol 14, No. 7, 367-70 (Jul 1974). (No charge for single copy)<sup>6</sup>
- R-825 THE THERMOPHYSICAL PROPERTIES OF METHANE, FROM 90 TO 500 K AT PRESSURES TO 700 BAR, by R. D. Goodwin. Nat. Bur. Stand. (U.S.), Tech. Note No. 653, 280 pages (Apr 1974). (C13.46:b53 - \$2.85)<sup>3</sup>
- B-1075 LIQUEFIED NATURAL GAS TECHNOLOGY. 50 pages, indexed by author and subject (Oct 1973). (COM-74-10323 - Domestic \$7.00; Foreign \$9.50)<sup>7</sup>
- B-1153 ENERGY AND SUPERCONDUCTIVITY. 33 pages, indexed by author and subject (Mar 1974). (COM-74-10713 - Domestic \$7.00; Foreign \$9.50)<sup>7</sup>
- PP-LNG+ A SURVEY OF LNG TECHNOLOGICAL NEEDS IN THE U.S.A. -- 1974 TO BEYOND 2000, by L. A. Sarkes and D. B. Mann. Paper presented at Fourth International Conference on Liquefied Natural Gas (Algiers, Algeria, Jun 24-27, 1974). (No charge for single copy)<sup>6</sup>

#### AVAILABILITY

- <sup>1</sup> Available from National Technical Information Service, Dept. A, Springfield, Virginia 22151 - Price \$3.00 for hard copy; \$1.45 for microfiche. Order by PB No., AD No., or N No.
- <sup>2</sup> Available from National Technical Information Service, Dept. A, Springfield, Virginia 22151 - Price \$6.00 for hard copy; \$1.45 for microfiche. Order by PB No., AD No., N No., or BNL No.
- <sup>3</sup> Available in hard copy from Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, at the price indicated. Order by NBS Monogr. No., NBS Spec. Publ. No., NSRDS-NBS No., C13.46 No., NASA Spec. Publ. No., NASA Cr No., or other number indicated.
- <sup>4</sup> Available in hard copy from the publisher or a bookstore at the price indicated.
- <sup>5</sup> Available in hard copy from Commissioner of Patents, U. S. Patent Office, Washington, D. C. 20231, at the price indicated. Order by Patent No.
- <sup>6</sup> Available in hard copy from National Bureau of Standards, Cryogenic Data Center, Boulder, Colorado 80302, at the price indicated. Order by R No., MR No., D No., B No., or Paper No. PLEASE INCLUDE SELF-ADDRESSED MAILING LABEL.
- <sup>7</sup> Available in hard copy from National Technical Information Service, Dept. A, Springfield, Virginia 22151, at the price indicated. Order by PB No., AD No., N No., NASA SP No., COM No., or other number indicated.





